

**REMARKS**

Claims 3, 6, 8-13, and 15-50 are now pending in this application. Claims 3, 6, 8-13, 15, and 16 are rejected. Claims 1-2, 4-5, 7, and 14 are previously cancelled. New claims 17-50 are added. Claims 6-13, and 15-16 are amended herein to place the claims in better form.

The Office Action has objected to the Preliminary Amendment filed on June 20, 2005 under 35 U.S.C. § 132(a) as introducing new matter to the specification. Tables 1, 2, and 3 are present in the original PCT application and the Preliminary Amendment merely replaced the German version of Tables 1, 2, and 3 with English versions. The U.S. Patent and Trademark Office ("USPTO") does not regularly require verifications of translations of PCT applications and none is required regarding Tables 1, 2, and 3. However, in order to advance the progress of the present application, Applicants will prepare an appropriate verification of translation of Tables 1, 2, and 3 and submit it to the USPTO shortly.

Claims 3, 6, 8-13, 15, and 16 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.

The Office Action identifies the following objections:

Regarding claim 16, the Office Action states that the specification does not teach how the following steps are carried out: method for manufacturing food which comprises the steps of converting NS starch into a state of largely released crystallization potential, converting a VS1 starch into a solution or melt,

**REMARKS**

Applicants' attorney and the Examiner spoke on August 18, 2008. The Examiner stated that it appears that the Amendment filed on April 24, 2008 was only partially scanned by the USPTO and requested that the Amendment be resubmitted in its entirety to ensure full scanning. Accordingly, a copy of the Amendment filed on April 24, 2008 is attached herewith in response to the Office Communication dated August 6, 2008 and in view of the conversation with the Examiner.

Respectfully submitted,

JORDAN AND HAMBURG LLP

By Frank J. Jordan  
Frank J. Jordan  
Reg. No. 20,456  
Attorney for Applicants

Bv and,

By Ricardo Unikel  
Ricardo Unikel  
Reg. No. 52,309  
Attorney for Applicants

Jordan and Hamburg LLP  
122 East 42nd Street  
New York, New York 10168  
(212) 986-2340

FJJ/RU/cj  
Enc. Amendment dated April 24, 2008

manufacturing a molecularly disperse mixture of NS and VS1 and forming a network by homo and/or heterocrystallization. The Office Action in particular asks how the NS starch is converted to a state of largely released crystallization potential or how is a molecularly disperse mixture created. The Office Action states that the specification does not teach any processing parameters to carry out these steps.

Regarding the question of now the NS starch is converted to the state of largely released crystallization potential, Applicants respectfully refer the Examiner to the paragraph bridging pages 8-9 of the specification as filed. Regarding the question of how a molecularly disperse mixture is created, Applicants respectfully refer the Examiner to the paragraph bridging pages 9-10 of the specification as filed. Regarding the method parameters and/or other steps, Applicants respectfully refer the Examiner to the paragraph bridging pages 8-9 through the first full paragraph of page 14 of the specification as filed. Applicants also wish to note the disclosure of WO 03/035026 A2 is incorporated into the present application and, in particular, that the first full paragraph of page 14 of the specification as filed states that the disclosure of WO 03/035026 includes information on the product parameters.

The Office Action states that a food product containing the starch network is claimed but that there is no teaching on how this starch network is obtained. Applicants respectfully point out that the food is obtained with the method of claim 16 and that support for claim 16 is discussed above.

It is Applicants' position that the enablement rejections have been properly addressed. Accordingly, Applicants respectfully request that the enablement rejection of claims 3, 6, 8-13, 15, and 16 be withdrawn.

Claims 3, 6, 8-13, and 15-16 have been rejected under 35 U.S.C. § 112, second paragraph, as indefinite.

Regarding claim 15, the term "and the like" has been removed. Regarding the terms of "a disperse phase" and "molecularly dispersed manner", the paragraph bridging pages 9-10 of the specification as filed explains how a disperse mixture is obtained so it is Applicants' position that these terms are not indefinite. Regarding the question of "a disperse phase of what?", it is clear from the claims that the disperse phase includes those components that are not contained in the starch network. Regarding the term "at least once in a state of largely released crystallization potential", Applicants respectfully refer the Examiner to the paragraph bridging pages 8-9 of the specification for appropriate explanation.

Regarding claim 16, the term "and the like" has been removed. Regarding Steps a, c, and d, please see the explanation regarding claim 15 above. Regarding step e, the terms homo and/or heterocrystallization are terms known by one of ordinary skill in the art. For example, attached is the abstract of an article (*Stereocomplex formation between enantiomeric poly(lactic acid)s. X. Binary blends from poly(D-lactide-CO-glycolide) and poly(L-lactide-CO-glycolide)*) that uses the term homocrystallization and attached is an excerpt from U.S. Patent No. 5,480,844

that uses the term heterocrystallization. Regarding Step f, appropriate corrections have been made to clarify that this relates to the product. This disclosure is implicitly clear from step f of claim 16. Regarding the statement that the claim is not commensurate in scope with the preamble, the method results in a product in accordance with any of claims 3, 6, 8-13, and 15. Also, it is clear from the specification that what is done is related to a food. Regarding the statement of it not being known how the food is manufactured nor how the steps recited are carried out, please see the explanation above regarding the enablement requirement.

Regarding claim 3, in response to the inquiry as to what the disperse phase is, please see the explanation above regarding claim 15.

Regarding claim 6, the term "in particular" has been removed.

Regarding claim 8, the term "this phase" has been removed. The term "interpenetrating networks" has also been removed.

Regarding claim 9, appropriate corrections have been made to address the Examiner's concerns regarding broad limitations together with narrow limitations. The phrase "in particular" has been removed. With regard to the term "absence of nuclei in excess water", Applicants respectfully refer the Examiner to the paragraph bridging pages 15-16 of the specification as originally filed for an explanation.

Claims 10, 11, 12, and 13 have been amended to address the Examiner's concerns.

It is Applicants' position that all of the indefiniteness issues have been properly addressed. Accordingly, Applicants respectfully request that the indefiniteness rejection of claims 3, 6, 8-13, and 15-16 be withdrawn.

Claims 3, 6, 8-13, and 15-16 have been rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,281,432 (Zallie et al.).

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *See Verdegaal Brothers Inc. v. Union Oil Company of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Claim 15 recites a food having a matrix formed by a starch network and a disperse phase where the matrix has a networkable starch and a first primary starch, the primary starch being a primarily branched starch and the networkable starch being primarily a linear starch with an amylose content > 30%. Additionally, the disperse phase comprises a second primary starch which is present in a native state or in a partially to completely gelatinized state. The Office Action has not identified where any of such elements are disclosed in the cited art. Although the Office Action has stated that such limitations are inherent in the prior art, no showing has been made in this regard. The burden is on the Examiner to support the determination that an allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. *See Ex Parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Int. 1990).

Claim 16 recites a method for manufacturing a food including converting a

networkable starch into a state of largely released crystallization potential, wherein the networkable starch is a primarily linear starch with an amylose content of > 30%. Also, a first primary starch is converted into a solution or melt, said first primary starch being a primarily branched starch. Also, a molecularly disperse mixture of the networkable starch and the first primary starch is manufactured. A second primary starch is mixed in the molecularly disperse mixture and a network is formed by homocrystallization or heterocrystallization of the networkable starch and the first primary starch or of the networkable starch and the first primary starch and a percentage of the second primary starch. The Office Action has not identified where any of such elements are disclosed in the cited art. The Office Action broadly states on page 7 that "Zallie et al disclose the method as in claim 16 because the starches are subjected to mixing, shearing and heating and the different starches are mixed as claimed." However, such statement does not explain where it is disclosed in Zallie et al. the converting of a networkable starch into a state of largely released crystallization potential, as recited in claim 16. Also, the Office Action has not explained where it is disclosed in Zallie et al. that the networkable starch is a primarily linear starch while the first primary starch is primarily a branched starch. Additionally, the Office Action has not explained where it is disclosed that a molecularly disperse mixture of the networkable starch and the first primary starch is manufactured. Additionally, the Office Action has not explained where it is

disclosed that the homocrystallization or heterocrystallization of the networkable starch is done.

Accordingly, at least for the aforementioned reasons, claims 15 and 16 are patentable over the cited art and notice to that effect is respectfully requested. Claims 3, 6, and 8-13 are patentable at least for the reason that they depend from a patentable base claim. *See In re Royka and Martin*, 180 USPQ 580, 583 (CCPA 1974).

Also, Applicants respectfully refer the Examiner to paragraph bridging pages 14-15 and the first full paragraph of page 15 of the specification as filed where it is clear that the products of the present invention have improved properties over conventional products.

New claims 17-51 have been added and are patentable at least for the reason that they depend from a patentable base claim.

Support for the new claims can be found in the specification. See, for example, the claims as filed.

Applicants respectfully request that the Examiner acknowledge the claim for foreign priority and the receipt of a copy of the certified priority document from the International Bureau.

Twenty four claim(s) in excess of twenty is/are added. **The fee of \$1200.00 for the claim(s) is provided for in the charge authorization presented in the PTO Form 2038, Credit Card Payment form, provided herewith.**



If there is any discrepancy between the fee(s) due and the fee payment authorized in the Credit Card Payment Form PTO-2038 or the Form PTO-2038 is missing or fee payment via the Form PTO-2038 cannot be processed, the USPTO is hereby authorized to charge any fee(s) or fee(s) deficiency or credit any excess payment to Deposit Account No. 10-1250.

In light of the foregoing, the application is now believed to be in proper form for allowance of all claims and notice to that effect is earnestly solicited.

Respectfully submitted,  
JORDAN AND HAMBURG LLP

By Frank J. Jordan  
Frank J. Jordan  
Reg. No. 20,456  
Attorney for Applicants

By and,

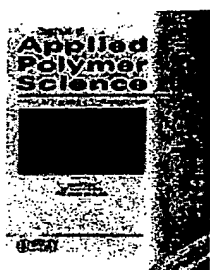
By Ricardo Unikel  
Ricardo Unikel  
Reg. No. 52,309  
Attorney for Applicants

Jordan and Hamburg LLP  
122 East 42nd Street  
New York, New York 10168  
(212) 986-2340

enc: Form PTO-2038

Abstract of Article (*Stereocomplex formation between enantiomeric poly(lactic acid)s. X. Binary blends from poly(D-lactide-CO-glycolide) and poly(L-lactide-CO-glycolide)*)

Excerpt from U.S. Patent No. 5,480,844



## Journal of Applied Polymer Science

What is RSS?

Journal of Applied Polymer Science

Volume 53, Issue 8, Pages 1061 - 1071

Published Online: 10 Mar 2003

Copyright © 1994 John Wiley &amp; Sons, Inc.

Save Title to My Profile

Set E-Mail Alert



Go to the homepage for this journal to access trials, sample copies, editorial and author information, news, and more.

e-mail print

SEARCH ☒ All Content☐ Publication Titles
 
[Advanced Search](#)[CrossRef / Google Search](#)[Acronym Finder](#)

## SEARCH IN THIS TITLE

Journal of Applied Polymer Science

 All Fields ☒

☒ Save Article to My Profile ☒ Download Citation < Previous Abstract | Next Abstract >

 Abstract | [References](#) | Full Text: [PDF \(783k\)](#) | [Related Articles](#) | [Citation Tracking](#)

## Article

Stereocomplex formation between enantiomeric poly(lactic acid)s. X. Binary blends from poly(D-lactide-CO-glycolide) and poly(L-lactide-CO-glycolide)

Hidetoshi Tsuji<sup>1</sup>, Yoshito Ikada<sup>2\*</sup><sup>1</sup>Technology Development Center, Toyohashi University of Technology, Tempaku-cho, Toyohashi, Aichi 441, Japan<sup>2</sup>Research Center for Biomedical Engineering, Kyoto University, 53 Kawahara-cho, Shogoin, Sakyo-ku, Kyoto 606, Japan

\*Correspondence to: Yoshito Ikada, Research Center for Biomedical Engineering, Kyoto University, 53 Kawahara-cho, Shogoin, Sakyo-ku, Kyoto 606, Japan

## Abstract

Binary blend films from lactide-rich poly(D-lactide-co-glycolide) (PDLG) and poly(L-lactide-co-glycolide) (PLLG) were obtained by casting methylene chloride solutions of the two mixed copolymers with different D- and L-lactide contents ( $X_{DL}$  and  $X_{LL}$ ), and their crystallization was studied by differential scanning calorimetry (DSC). Four combinations were selected from the binary (A-B) blends: mixing of the same polymer [ $X_{DL}(A) = X_{DL}(B)$  or  $X_{LL}(A) = X_{LL}(B)$ ], blending under  $X_{DL}(B) = X_{LL}(A)$ , blending of a D-lactide homopolymer [ $X_{DL}(B) = 1$ ] with other PDLGs, and blending of a D-lactide homopolymer [ $X_{DL}(B) = 1$ ] with other PLLGs. Racemic crystallites were exclusively formed between PDLG and PLLG when they had high lactide unit contents. The melting point and enthalpy of fusion of the racemic crystallites decreased with a decrease in  $X_{DL}$  of PDLG or  $X_{LL}$  of PLLG, suggesting that glycolide units in the polymer disturbed the growth of the racemic crystallites. A similar behavior was also observed for the homocrystallization in nonblended copolymer films. Homocrystallites composed entirely either of D-lactide unit or L-lactide unit sequences were formed when one component was crystallizable and the other component had the same sign of optical rotation or very different lactide content. An interesting finding was that even nonhomocrystallizable lactide-poor PDLG and PLLG could form racemic crystallites when both were blended. © 1994 John Wiley & Sons, Inc.

Received: 13 September 1993; Accepted: 22 January 1994

Digital Object Identifier (DOI)

10.1002/app.1994.070530808 [About DOI](#)

## Related Articles

- Find other [articles](#) like this in Wiley InterScience
- Find articles in Wiley InterScience written by any of the [authors](#)

Wiley InterScience is a member of CrossRef.



## SEARCH BY CITATION

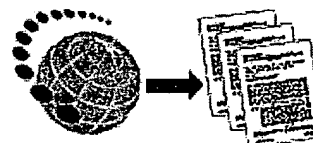
Vol: Issue: Page:

 Take our  
User Survey

 for a chance  
to win an iPod

## REPRINT INQUIRIES



Need a reprint?

Paper or electronic reprints are available for all content published on Wiley InterScience. Inquiries can be submitted online.

[Find out more about reprints](#)

## SPECIAL ISSUE


 Self-Assembly  
and Hierarchical  
Structure  
Formation of  
Macromolecules

FREE access to full text articles

on this special issue of  
**Macromolecular Rapid  
Communications.**

- [Aniline Oligomers...](#)
- [Responsive Backbones  
Based on...](#)
- [Self-Assembled PEO-  
Peptide Nanotapes...](#)

---

**NOW ONLINE**



The section *Materials Views*  
provides highlights and  
commentaries from the current  
literature.  
[Find out more.](#)

---

**FREE ONLINE ACCESS**



**Macromolecular  
Reaction  
Engineering ?  
FREE in 2008!**

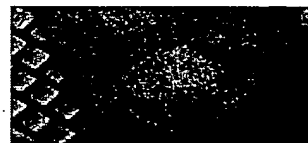
Ask your librarian to opt-in for  
complimentary online access to  
MRE throughout 2008.

[More](#)

---

**NOW AVAILABLE**

**Backfiles on Pay-Per-View**



More than 600,000 journal  
articles starting at **Volume 1,  
Issue 1**, dating as far back as  
1800s and spanning the  
disciplines of chemistry, life  
sciences, medicine and  
materials science are now  
available online for **Pay-Per-  
View purchase on Wiley  
InterScience.**

[Browse Journals by Subject](#)

---

[About Wiley InterScience](#) | [About Wiley](#) | [Privacy](#) | [Terms & Conditions](#)

Copyright © 1999-2008 [John Wiley & Sons, Inc.](#) All Rights Reserved.



US005480844A

**United States Patent** [19]

Matsui et al.

[11] **Patent Number:** **5,480,844**[45] **Date of Patent:** **Jan. 2, 1996**

[54] **CRYSTALLIZED-GLASS-MADE ARTIFICIAL NUCLEUS FOR PEARL, PRODUCTION PROCESS OF THE ARTIFICIAL NUCLEUS, AND PEARL PRODUCED USING THE ARTIFICIAL NUCLEUS**

4,652,312 3/1987 Grossman et al. .... 501/3 X

**FOREIGN PATENT DOCUMENTS**

405284874 11/1993 Japan ..... 119/244

[75] **Inventors:** Akira Matsui, Kyoto; Yoshinori Morita, Shiga; Hiroyuki Inoue, Shizuoka; Yoshiaki Inoue, Mie, all of Japan

*Primary Examiner*—Karl Group  
*Attorney, Agent, or Firm*—Lowe, Price, LeBlanc & Becker

[73] **Assignee:** J. Morita Mfg. Corp., Kyoto, Japan

[21] **Appl. No.:** 368,802

[22] **Filed:** Jan. 5, 1995

[30] **Foreign Application Priority Data**

Jan. 5, 1994 [JP] Japan ..... 6-011281

[51] **Int. Cl.<sup>6</sup>** ..... C03C 10/16

[52] **U.S. Cl.** ..... 501/3; 501/86; 65/33.3; 119/244

[58] **Field of Search** ..... 501/3, 86; 65/33.3; 119/244

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

3,839,055 10/1974 Grossman ..... 501/3

[57] **ABSTRACT**

An artificial nucleus made of a crystallized glass is provided for use in the production of a pearl. The crystallized glass has been produced using a batch having the following composition:

SiO<sub>2</sub> . . . 40–65 wt. %

MgO . . . 3–16 wt. %

MgF<sub>2</sub> . . . 6.5–17 wt. %

K<sub>2</sub>O . . . 7.5–18 wt. %

ZrO<sub>2</sub> . . . 0.01–15 wt. %

CaO . . . 0.1–20 wt. %

P<sub>2</sub>O<sub>5</sub> . . . 0.1–20 wt. %

BaO and/or SrO . . . 0.1–13 wt. %

and has crystalline phases composed primarily of tetrasilicic fluormica and formed in a glass matrix phase.

**7 Claims, No Drawings**

around fluorite crystals align around the fluorite crystals as nuclei, so that they grow into crystals of fluorapatite or calcium mica and the fluorite crystals disappear. Namely, the crystallized-glass-made artificial nucleus of this invention for a pearl is primarily composed of crystalline phases of tetrasilica fluormica and also contains the above-described crystalline phases of fluorapatite and the like.

In relation to the crystallization step described above, a description will next be made of a method for controlling the particle sizes of mica crystals in the mica-base crystallized glass to relatively small ones, for example, to an average particles size of 2–15  $\mu\text{m}$  in the present invention.

As a method for controlling the particle sizes of the above-described crystals, the following method may be adopted for example:

(1) The amount of F should be increased relative to the whole MgO in the glass as a mother glass for the mica-based crystallized glass. Especially,  $\text{MgF}_2$  is incorporated at a high content so that a composition capable of forming many sellite crystals as nuclei for the formation of mica crystals is adopted.

(2) As a control to the growth of mica crystals,  $\text{SiO}_2$  and  $\text{ZrO}_2$  components are added so that the movement of elements in a glass which becomes a mother glass for a mica-base crystallized glass can be controlled. This is to control by  $\text{SiO}_2$  and  $\text{ZrO}_2$  the viscosity of the glass matrix around mica crystals, said viscosity varying from time to time during formation of mica crystals. Further, the addition of  $\text{ZrO}_2$  can improve the chemical resistance of the glass matrix and can also prevent surface and internal heterocrystallization by enstatite ( $\text{MgSiO}_3$ ). In addition, the addition of  $\text{ZrO}_2$  controls the refractive indices of the glass matrix phase and the formed crystalline phases so that the translucence of the material is retained.

In the production process of the crystallized-glass-made artificial nuclei of this invention for pearls, it is only necessary, as a method for improving the crystallinity, to form many sellite crystals which act as nuclei for the formation of mica crystals. For this purpose, it is necessary to increase the content of F relative to the whole MgO in the glass as a mother glass for the mica-base crystallized glass, and also to add  $\text{SiO}_2$  and  $\text{ZrO}_2$  and to bring the contents of  $\text{SiO}_2$ , MgO and  $\text{K}_2\text{O}$ , the components of mica crystals, into conformity with the element ratio of tetrasilicon fluormica crystals, i.e.,  $\text{KMg}_{2.5}\text{Si}_4\text{O}_{10}\text{F}_2$ . As a method for controlling the refractive index of the glass matrix other than the crystallized portions, it is important to control the composition of the glass matrix phase so that the refractive index of the glass matrix becomes close to that of crystals of tetrasilicon fluormica.

In the production process of the crystallized-glass-made artificial nuclei of this invention for pearls, a batch has such a glass composition as will be described next.

Namely, the composition of the crystallized glass according to the present invention is as follows:

$\text{SiO}_2$  . . . 40–65 wt. %

MgO . . . 3–16 wt. %

$\text{MgF}_2$  . . . 6.5–17 wt. %

$\text{K}_2\text{O}$  . . . 7.5–18 wt. %

$\text{ZrO}_2$  . . . 0.01–15 wt. %

$\text{CaO}$  . . . 0.1–20 wt. %

$\text{P}_2\text{O}_5$  . . . 0.1–20 wt. %

BaO and/or SrO . . . 0.1–13 wt. %

If the content of  $\text{SiO}_2$  is lower than 40 wt. % in the above-described composition of the crystallized glass according to the present invention, the viscosity of the glass

become lower so that the particle sizes of crystals can hardly be controlled to 15  $\mu\text{m}$  or smaller and the chemical resistance of the matrix glass phase is extremely deteriorated.  $\text{SiO}_2$  contents greater than 65 wt. %, on the other hand, lead to formation of more heterocrystals such as cristobalite, so that the translucence is impaired and at the same time, the viscosity of the glass is increased, thereby making it difficult to control the particle sizes of crystals to 2  $\mu\text{m}$  or greater.

If the content of MgO is lower than 3 wt. % in the above-described composition, the crystallinity is lowered and the hardness is increased, so that the workability is impaired. If the content of MgO is greater than 16 wt. %, enstatite crystals are formed upon crystallization so that the translucent color shade is impaired.

If the content of  $\text{MgF}_2$  becomes lower than 6.5 wt. % in the above composition, it becomes difficult to control the reduction in crystallinity and the particle sizes of crystals, whereby the workability is impaired. This also leads to the formation of heterocrystals such as enstatite crystals in a large amount, so that the color shade is impaired. If the content of  $\text{MgF}_2$  exceeds 17 wt. %, on the other hand, the devitrification property of the glass is increased, thereby making it difficult to control the formation of crystals.

If the content of  $\text{K}_2\text{O}$  is smaller than 7.5 wt. % in the above composition, the refractive index of the glass matrix phase is changed so that the color shade is impaired and in some instances, the crystallinity is also lowered. If the content of  $\text{K}_2\text{O}$  is greater than 18 wt. %, the chemical resistance of the matrix glass phase is deteriorated and moreover, phenocrystalline crystals are formed, thereby making it difficult to control the particle sizes of crystals.

If the content of  $\text{ZrO}_2$  becomes lower than 0.01 wt. % in the above composition, it becomes difficult to control crystals to be formed so that the chemical resistance is impaired and the maintenance of translucence becomes difficult.  $\text{ZrO}_2$  contents higher than 15 wt. %, on the other hand, lead to a reduction in the crystallinity of mica crystals.

In the present invention, the control of growth of crystals can be achieved by the combination of the  $\text{ZrO}_2$  component and the  $\text{SiO}_2$  content. Accordingly, in relation to the amount of the  $\text{SiO}_2$  component to be used, it is possible to substantially reduce the amount of the  $\text{ZrO}_2$  component to be employed.

If the content of CaO or  $\text{P}_2\text{O}_5$  is lower than 0.1 wt. % in the above-described composition, the nacreous-layer-forming ability is impaired. If the content of CaO or  $\text{P}_2\text{O}_5$  is higher than 20 wt. %, on the other hand, fluorapatite crystals and calcium mica crystals which are large in particle size are formed, thereby making it difficult to control the particle size and also to retain the translucent color shade.

In the above-described composition, BaO and SrO are added to adjust the specific gravity of the resulting pearls to the specific gravity ( $2.85 \pm 0.10$ ) of cultured pearls obtained using the conventional natural nuclei. This specific-gravity-controlling material is preferably one not affecting the other properties of the cultured pearls so produced, and BaO or SrO is used as described above.

When BaO is used as a specific-gravity-controlling material, for example, BaO contents smaller than 0.1% result in a specific gravity smaller than the desired specific gravity of  $2.85 \pm 0.10$ . BaO contents higher than 10%, on the other hand, conversely lead to a specific gravity greater than  $2.85 \pm 0.10$  and moreover, form barium mica crystals in a large amount so that the strength and rupture toughness are increased, the workability is deteriorated and the translucence of the color shade is lost.

The crystallized glass used for the artificial nuclei of this invention for pearls presents a uniform, translucent, milky white color shade, and its quality is very close to those of